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The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

THANK YOU

very much indeed for your order for  
Prof. Dr. F. Buxbaum's HEALTH SALTS  
for CACTUS and other Succulent Plants.

We are convinced you will be very satisfied with the results obtained.

Kindly let us know after some time what change in your plants you have noticed which you attribute to the effect of the HEALTH SALTS. We are grateful for every information. Any query will be promptly dealt with, and we shall reward outstanding successes.

ATRA LIMITED  
3, St. Mary's Mansions,  
London, W.2.

Why use

Prof. Dr. F. Buxbaum's HEALTH SALTS

for Cactus and other SUCCULENT Plants?

Because they will

- (1) encourage the development of sturdy compact growth, discourage development of lush and soft tissue;
- (2) induce an increase in flowering capacity, even with species normally reluctant to produce blooms;
- (3) encourage the production of stronger spines;
- (4) allow the frequency of repotting (always a check to growth) to be reduced;
- (5) reduce losses in the seedling stages;
- (6) eliminate exhaustion of the stock in grafted plants.

The use of Prof. Dr. F. Buxbaum's HEALTH SALTS for cactus and other succulent plants does not call for a change in the normal frequency of watering. When doses of HEALTH SALTS are being administered the water should, however, be poured gently over the surface of the soil in the pot, pan or box. Where watering is normally done by immersion of the pot the full effect may not be obtained.

As watering with the HEALTH SALTS prevents exhaustion of the soil, repotting need take place only infrequently. Care must, however, be taken that the pot is large enough to start with, and that the soil is not made too acid by overwatering. A very open, light, and porous mixture is to be strongly recommended.

As all the elements necessary for strong and healthy growth are contained in THE HEALTH SALTS seeds may be sown, and seedlings kept, in pure sand for the first year thus almost eliminating the risk of damping off, mould, etc. which tend to occur when seedlings are raised in the more orthodox soil mixtures.

If you want your plants to produce  
MORE FLOWERS and STRONGER SPINES  
give them

T H E H E A L T H S A L T S  
for Cactus and other Succulent Plants

prepared according to  
the scientific formula of Prof. Dr. F. Buxbaum.

ATRA LTD. / 3, St. Mary's Mansions / LONDON, W.2.

MORE FLOWERS - BETTER SPINES - STRONGER PLANTS

T H E H E A L T H S A L T S  
for CACTUS and other SUCCULENT Plants  
(concentrated)

prepared according to  
the scientific formula of Prof. Dr. F. Buxbaum.

The Health Salts contain all the elements necessary to the well-being of Cactus and other Succulent Plants, mixed in such proportions as to particularly encourage and stimulate the development of flowerbuds.

The Health Salts are blended in such a way that some portion is freely soluble, some portion less so, thus the plants gain immediate benefits and still have a reserve of benefits on which to draw.

The Health Salts should be given in the proportion of one level measure to one quart of water.

The Health Salts should be given with the normal watering.

The dosage should be:-

At the commencement of the growing season not more frequently than once a week.

At the height of the growing season up to twice a week during periods of bright and sunny weather.

Towards the end of the growing season discontinue administering The Health Salts.

The Health Salts should be given only to healthy plants in the stages of active growth. They must never be given to weak, sickly or pest-infested plants. Make sure that the root system and body of any plant given the benefit of The Health Salts are free from insect pests, rot or disease. Such plants should be treated in the normal way and may be given the first dosage as soon as they show healthy new growth. It is then that the maximum benefit will be obtained from The Health Salts.

The Health Salts are particularly effective with Cactus and other Succulent Plants where these are potted in a very light soil mixture containing a low proportion of humus (rich soil) and a high proportion of coarse sand and broken brick.

Cacti grown in such soil will develop spines equal to those of imported plants. All succulents, even species which are normally difficult to flower, will give satisfactory results. It is, of course, essential that the plants be grown in a light, airy position where they can receive adequate sunshine - only then can they obtain full benefit from The Health Salts.

Prof. Dr. F. Buxbaum's HEALTH SALTS are hygroscopic and will harden under certain conditions. This will not affect their qualities in any way. Loosen the quantity required and use as prescribed.

ATRA LTD. / 3, ST. MARY'S MANSIONS / LONDON, W. 2.

MEASURE  
INSIDE TIN

TRIBUS I. Archicereidinae F. Buxb. trib. nov.

Cereanae Br. & R. pp.; Echinocactae K. Schum. pp.; Leptocerei Berger nom. nud. pp.; Pfeifferae Berger nom. nud. pp.; Trichocerei Berger pp. Austrocereinae-Corryocerei Backeb. nom. nud.; Austrocereinae-~~Archicereinae~~ - Trichocerei Backeb. nom. nud. pp.; Boreocereae-Leocerei Backeb. nom. nud. pp.; Boreocereae-Cephalocerei Backeb. nom. nud. pp. \*)

Footnote: \*) Backeberg has filled his "Systematische Übersicht" with latin named "Taxa", thus that - in his 2nd edition 1942 - 178 taxa over the genus belong to his 189 genera, 155 of them for the 162 genera of Cereoidae. None of these is described with a latin diagnosis, thus all being "nomina nuda"; in the 2nd edition he has sometimes given a suitable description in German. But Backeberg points out himself, that these names are used only instead of numbers of a key, giving a characteristic by a name; thus they are no true taxa and, indeed, many of them have an adjective character and occur several times in different parts of the "system". (It is ~~very~~ funny, that nevertheless Backeberg has put his author-name behind each of these names.)

Thus these names are ignored here except these of tribes, subtribes and "nationes". So far the name of any "Natio" corresponds to a taxon used here and follows the international rules, it is used and validated in this paper.

Even Berger did not give any description to his "Sippen" as he knew the provisional character of them. These, also, ~~are~~ partly are used and validated here.

GENUS TYPICUM : Leptocereus (Berger) Br. & R.

Genera: Armatocereus Backeb.  
 Corryocactus Br. & R.  
 Erdisia Br. & R.  
 Eulychnia Philippi  
 Facheiroa Br. & R. (incl. Thrixanthocereus Backeb.)  
 Leocereus (Berger) Br. & R.  
 Neoraimondia Br. & R. (incl. Neocardenasia Backeb.)  
 Samaipatanocereus Cardenas  
 Zehntnerella Br. & R.

Leptocereus (Berger) Br. & R.

TRIBUS II. HYLOCEREIDINEAE Br. & R. emend. F. Buxb.

Rhipsalidaceae K. Schum.;  
Rhipsalideae P. DC.; Echinocactaceae K. Schum.; Hylocereanae Br. & R.  
pro subtrib.; Cereanae Br. & R. pp.; Epiphyllanae Br. & R.;  
Rhipsalidanae Br. & R.; Epiphyllae Berg. nom. nud.; Hylocereae  
Berger nom. nud.; Leptocerei Berger nom. nud. pp.; Nyctocerei Berger  
nom. nud. pp.; Pachycerei Berger nom. nud. pp.; Pfeifferae Berger  
nom. nud. pp.; Austrocereae-Corryocerei Backeb. nom. nud. pp.;  
Austrocereinae-Leptocerei Backeb. nom. nud. pp.; Boreocereinae-  
Nyctocerei Backeb. nom. nud. p.p.; Boreocereinae-Leptocerei Backeb.  
nom. nud. pp.; Boreocereinae-Hellocerei Backeb. nom. nud. pp.;  
Hylocereinae-Helichylocerei Backeb. nom. nud.; Hylocereinae-  
Nyctohylocerei Backeb. nom. nud.; Hylocereinae-Strophocerei Backeb.  
nom. nud.; Phyllocacyinae Backeb. nom. nud.; Epiphyllodes Backeb. nom.  
nud.

GENUS TYPICUM: Selenicereus (Berger) Br. & R.

Subtribus I. Nyctocereinae F. Buxb. subtrib. nova

Echinocactaceae K. Schum. pp.; Cereanae Br. & R. pp.; Nyctocerei Ber-  
ger nom. nud. pp.; Leptocerei Berger nom. nud. pp.; Pachycerei Berger  
nom. nud. pp.; Austrocereae-Corryocerei Backeb. nom. nud. pp.; ~~Rhipsalidaceae~~  
Boreocereinae-Nyctocerei Backeb. nom. nud. pp.; Boreocereinae-  
Leptocerei Backeb. nom. nud. pp.

GENUS TYPICUM: Nyctocereus (Berger) Br. & R.

Linea A. Nyctocerei F. Buxb. linea nova

Genera: Nyctocereus (Berger) Br. & R. GENUS TYPICUM  
Brachycereus Br. & R.  
Peniocereus (Berger) Br. & R.

Linea B. Acanthocerei F. Buxb. linea nova

Genera: Acanthocereus (Berger) Br. et R. GENUS TYPICUM  
Dendrocereus Br. & R.

Linea C. Harrisiae F. Buxb. linea nova

Genera: Harrisia Britton GENUS TYPICUM  
Eriocereus (Berger) Riccobono

Linea D. Hellocerei F. Buxb. linea nova

Genera: Hellocereus (Berger) Br. & R. GENUS TYPICUM  
Aporocactus Lemaire

Subtribus 2. *Hylocereineae* ~~V/XXXXX/XXXXXX/~~  
Br. & R. emend. F. Buxb.

*Hylocereanae* Br. & R.; *Echinocacteae* K. Schum. pp.; *Epiphyllanae* Br. & R. pp.; *Hylocereae* Berger nom. nud.; *Epiphyllae* Berger nom. nud. pp.; *Hylocereineae-Nyctohylocerei* Backeb. nom. nud.; *Hylocereinae-Strophocerei* Backeb. nom. nud.; *Phyllocactinae* Backeb. nom. nud. pp.

GENUS TYPICUM: *Selenicereus* (Berger) Br. & R.

Genera: *Wercklerocereus* Br. & R.  
*Weberocereus* Br. & R.  
*Eocremocactus* Br. & R.  
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*Mediocactus* Br. & R.  
*Wilmattea* Br. & R.  
*Hylocereus* (Berger) Br. & R.  
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*Selenicereus* (Berger) Br. & R.  
*Cryptocereus*.....  
*Deamia* Br. & R.  
*Strophocactus* Br. & R.

Subtribus 3. *Epiphyllinae* Br. & R.  
~~V/XXXXX/XXXXXX/~~ emend. F. Buxb.

*Epiphyllanae* Br. & R. pp.; *Epiphyllae* Berger nom. nud. pp.;  
*Phyllocactinae* Backeb. nom. nud. pp.

GENUS <sup>TYPICUM</sup> UNICUM: *Epiphyllum* Haworth (incl. *Marnieria* Backeb.), *unicum*

Subtribus 4. *Disocactinae* F. Buxb. subtrib. nov.

*Epiphyllanae* Br. & R. pp.; *Epiphyllae* Berger nom. nud. pp.;  
*Phyllocactinae* Backeb. nom. nud.

GENUS TYPICUM: *Nopalxochia* Br. & R.

Genera: *Nopalxochia* Br. & R.  
(*Loleira* Anthony)  
*Chiapsasia* Br. & R.  
*Disocactus* Lindley  
*Wittia* K. Schum.

Subtribus 5. Rhipsalineae ~~K./Schumann~~ P. DC.

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Rhipsalideae P. DC. ; Rhipsalidanae Br. & R.; Epiphyllanae Br. & R. pp.  
Pfeifferae Berger nom. nud. pp.; Epiphyllodes Backeb. nom. nud.

GENUS TYPICUM : Rhipsalis Gaertner

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Linea A. Archirhipsalidae F. Buxb. linea nova

Genera: Pfeiffera Salm GENUS TYPICUM  
Acanthorhipsalis (K. Schumann) Br. & R.

Linea B. Zygocacti F. Buxb. linea nova

Genera: Erythrorhipsalis Berger  
Hatiota DC. (Hatiota Br. & R.)  
Rhipsalidopsis Br. & R. (incl. Epiphyllopsis Berger)  
Schlumbergera Lemaire GENUS TYPICUM  
Zygocactus K. Schumann (incl. Epiphyllanthus Berger  
incl. Vollia Backeb.)  
/? Pseudozygocactus Backeb.?

Linea C. Eurhipsalidae F. Buxb. linea nova

Genera: Pseudorhipsalis Br. & R.  
Rhipsalis Gaertner GENUS TYPICUM  
Lepismium Pfeiffer

TRIBUS III. PACHYCEREIDINEAE Berger ex F.Buxb.

Pachycerei Berger nom.nud.; Gymnocerei Berger nom.nud.pp.;  
Echinocactae K.Schumann pp.; Cereanae Br. & R. pp.; Boreocereinae-  
-Pachycerei Backeb.nom.nud.

GENUS TYPICUM : Pachycereus (Berger) Br. & R.

Genera: Lemaireocereus Br. & R. (Incl. Neolemaireocereus Backeb.  
" Isolatocereus Backeb.  
" Marginatocereus Backeb.  
" Ritterocereus Backeb.)

Pachycereus (Berger) Br. & R.  
Neobuxbaumia Backeb.  
Carnegiea Br. & R.  
Mitrocereus Backeb.  
Cephalocereus Pfeiffer

Genera incertae sedis:

Escontria Br. & R.  
Anisocereus Backeb.

TRIBUS IV. GYMNOcereidINEAE Berger ex F.Buxbaum

Gymnocerei<sup>2</sup>Cereoides Berger nom.nud.; Echinocactae K.Schumann pp.;  
Cereanae Br. & R. pp.; Trichocerei Berger nom.nud.pp.;  
Boreocereinae-Cephalocerei Backeb.nom.nud.; Boreocereinae-Gymnoceri  
(Berger)Backeb. nom.nud.

GENUS TYPICUM : Cereus Miller

Genera : Arrojadoc Br. & R.  
Browningia Br. & R. (incl. Gymnanthocereus Backeb.)  
Austrocephalocereus Backeb. (incl. Colocephalocereus Bckb.)  
Cereus Miller (incl. Monvillea Br. & R.  
incl. Subpilocereus Backeb.  
incl. Brasilicereus Backeb.)  
Stephanocereus Berger  
Stetsonia Br. & R.

incertae sedis:

Jasminocereus Br. & R.  
Lophocereus (Berger) Br. & R.  
Myrtillocactus Console  
Neobabbottia Br. & R.

TRIBUS V. TRICHOCEREIDINEAE Berger ex E. Buxbaum

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Trichocerei Berger nom. nud.; ~~Echid~~ Echinocactaceae K. Schumann pp.;  
 Cereanae Br. & R. pp.; Echinocactanae Br. & R. pp.; Echinocereanae  
 Br. & R. pp.; Austrocereinae-Milae Backeb. nom. nud.; Austrocereinae  
 -Lobiviae Backeb. nom. nud.; Austrocereinae-Loxanthocerei Backeb.  
 nom. nud.; Boreocereinae-Cephalocerei Backeb. nom. nud. pp.;  
 Austrocereinae-Austroechinocacti Backeb. nom. nud. pp.  
 GENUS TYPICUM: Echinopsis Zucc.

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Subtribus 1. Trichocereinae F. Buxb. subtrib. nov.

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Trichocerei Berger nom. nud. pp.; Echinocaceae K. Schumann pp.;  
 Cereanae Br. & R. pp.; Echinocereanae Br. & R. pp.; ~~Boreo~~ Austro-  
 cereinae-Lobiviae Backeb. nom. nud. pp.; Austrocereinae-Austro-  
 echinocacti Backeb. nom. nud. pp.; Boreocereinae-Cephalocerei Backeb.  
 nom. nud. pp.; Boreocereinae-Nyctocerei Backeb. ~~pp.~~ nom. nud. pp. .

GENUS TYPICUM : Echinopsis Zucc.

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Genera : Trichocereus (Berger) Riccob. (incl. Helianthocereus Backeb.  
 incl. Weberbauerocereus Backeb.)  
 Echinopsis Zucc. (incl. Pseudolobivia Backeb.)  
 Haageocereus Backeb. (incl. ~~Boreo~~ ~~Peruvocereus~~ ~~Akers~~)  
 Peruvocereus Akers)  
 Arthrocerus Backeb. (incl. Setiechinopsis Backeb.)  
 Espostoa Br. & R. (incl. Pseudoespostoa Backeb.)  
 Soehrensia Backeb.  
 Acanthocalycium Backeb.

Subtribus 2. Rebutiinae F. Buxb. subtrib. nov.

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Trichocerei Berger nom. nud. pp.; Echinocactaceae K. Schumann pp.;  
 Echinocereanae Br. & R. pp.; ~~Lobiv~~ Austrocereae-Lobiviae Backeb.  
 nom. nud. pp.; Austrocereae-Milae Backeb. nom. nud. pp.

GENUS TYPICUM : Rebutia K. Schumann

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Genera: Lobivia Br. & R. sens. lat. (incl. Acantholobivia)  
 (Hymenorebutia Fric)  
 Rebutia K. Schumann (incl. Cyllindrorebutia Fric, Digo-  
 rebutia Fric/syn. Pygmaelobivia/  
 Medioblobivia Backeb. Aylosteria ~~sp.~~  
 Spegazzini)  
 Chamaecereus Br. & R.  
 Mila Br. & R.

Subtribus 3. Loxanthocerei Backeberg ex F. Buxbaum

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Austrocereae-Loxanthocerei Backeb. nom. nud.; Echinocactaceae K. Schum.

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Subtribus 3. *Loxanthocereineae* Backeb. ex.F.Buxb.

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Austrocereae-Loxanthocerei Backeb.nom.nud.; Echinocactaeae K.Schum.pp  
 Cereanae Br. & R. pp.; Echinocactanae Br.&R. pp.; Trichocerei Ber-  
 ger nom.nud. pp.; Austrocereae-Austroechinocacti Backeb.nom.nud.pp.;

GENUS TYPICUM: *Borzicactus Riccobono*

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*Loxanthocereus* Backeb. ( incl *Maritimocereus* Akers et Buin.)  
*Borzicactus* Riccob.  
*Bolivicerus* Cardenas  
*Denmoza* Br. & R.  
*Cleistocactus* Lemaise  
*Saticereus* Backeb.  
*Oreocereus* (Berger) Br.& R.  
*Morawetzia* Backeb.  
*Arequipa* Br. & R.  
*Matucana* Br. & R.  
*Croya* Br. & R.

TRIBUS VI. NOTOCACTIDINEAE F. Buxb. tribus nova. \*)

Pseudotrichocereidinae F. Buxb. nomen provisorium \*)  
 Echinocactaeae K. Schumann pp.; Echinocereanae Br. & R. pp.;  
 Echinocactanae Br. & R. pp.; Cactanae Br. & R.; Cactanae Br. & R.;  
 Echinocactaeae (Mexicanae) Berger nom. nud. pp.; Echinocactanae-Erianthi  
 Berger nom. nud. pp.; Gymnocerei-Cactoidei Berger nom. nud.; ~~Pyrrhocactus~~  
 Austrocereidinae-Austrocchinocacti Backeb. nom. nud.; Boreocereidinae-  
 Boreocchinocacti Backeb. nom. nud. pp.; Boreocereidinae-ephalocacti  
 Backeb. nom. nud.

\*) The name has been changed as a subdivision of the tribe is soon intended; according the rules of the INC in the case of a subdivision the name of a lower taxon must arise repeatedly in the higher taxon. "Pseudotrichocerei" has been used for distinction from the true Trichocerei in a lecture held at the I. Congress of the IOS in Zurich only.

GENUS TYPICUM : Notocactus (K. Schumann) Berger

Genera: Austrocactus Br. & R.  
 Notocactus (K. Schum.) Berger (incl. ~~Brasilicactus Backeb.~~ / ~~incl. Eriocactus Backeb.~~ /  
 Ixaya Backeb.)

Eryosyce Philippi

Neoporteria Br. & R.  
 Neochilenia Backeb. - \*)  
 Pyrrhocactus Berger  
 Horridocactus Backeb.

\*) These genera probably will become reunited.  
 Reicheocactus Backeberg is not included because this genus is not based at a real plant but at a dubious description

Copiapoa Br. & R.

Gymnocalycium Pfeiffer (incl. Weingartia Werderm. \*)  
 \*) according personal communication of P. P. C. Hutchison)

Neowerdermannia Backeb.  
 Discocactus Pfeiffer  
 Melocactus Link-et-Otto  
 Malaeocarpus Salz

Parodia Spezzazzini  
 Frailea R. & R.  
 Blossfeldia Werderm.  
 Astrophytum Lemaire

TRIBUS VII. ECHINOCEREIDINEAE Br. & R. emend. F. Bux

Echinocereanae Br. & R. pp.; Echinocactaceae K. Schum. pp.; Cereanae Br. & R. pp.; Nyctocerei Berger pp.; Echinocerei Backeb. nom. nud.; Heliocerei Backeb. nom. nud. pp.

GENUS TYPICUM : Echinocereus Engelm.

Genera; Bergerocactus Br. & R.  
Machaerocereus Br. & R.  
Rathbunia Br. & R.  
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Wilcoxia Br. & R.  
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Echinocereus Engelm.

TRIBUS VIII. EUECHINOCACTIDINEAE F. Buxb. trib. nov.

Euechinocactineae F. Buxb. nom. nov.; Echinocactaceae K. Schum. pp.; Mamilariaceae K. Schum. pp.; Echinocactanae Br. & R. pp.; Coryphanthanae Br. & R. pp.; Echinocactaceae (Mexicanae) a) Erianthi Berger nom. nud. b.) Lepidanthi Berger nom. nud. c.) Gymnanthi Berger nom. nud. pp.; Pseudomamilariaceae Bergernom. nud.; Coryphanthaceae Berger nom. nud.; Chasmatothelae Berger nom. nud.; Cochemiaceae Berger nom. nud.; Pelecyporaceae Berger nom. nud.; Ariocarpi Berger nom. nud.; Boreoechinocacti Backeb. nom. nud. pp.

GENUS TYPICUM : Echinocactus Link et Otto

Subtribus 1. Echinocactinae F. Buxbaum subtrib. nov.

Echinocactaceae K. Schum. pp.; Echinocactanae Br. & R. pp.; Echinocactaceae (Mexicanae) - Erianthi Berger nom. nud. pp.; Boreoechinocacti Backeb. nom. nud. pp.

GENUS TYPICUM : Echinocactus Link et Otto

Genera : Echinocactus Link et Otto  
Homalocephala Br. & R.

Subtribus 2. Thelocactineae F.Buxb. subtrib. nov.

"Ramus I" F.Buxb. nom. prov.; Echinocactaeas K. Schum. pp.; Mamillari-  
eae K. Schum. pp.; Echinocactanae Br. & R. pp.; Coryphanthae Br. & R.  
pp.; Echinocactaeas (Mexicanae) a.) Lepidanthi b.) Gymnanthi Berger  
nom. nud. pp.; Pseudomamillariae Berger nom. nud. pp.; Chasmatothelae  
berger nom. nud. ; Pelecyphorae Berger nom. nud. ; Ariocarpi Berger  
nom. nud. ; Boeseochinocacti Backeb., nom. nud. pp.;

GENUS TYPICUM : Thelocactus (K. Schumann) Br. & R.  
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Linea A. Thelocacti F. Buxbaum linea nova

Genera: Sclerocactus Br. & R.  
Pediocactus Br. & R.  
Uthia Br. & R.  
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Ancistrocactus Br. & R.  
Hamatocactus Br. & R. ( incl. Glandulicactus Backeb., )  
Oehmea F. Buxb. incl. Brittonrosea.....  
Cumarinia ( Knuth ) F. Buxb.  
\* \* \* \* \*  
Echinomastus Br. & R.  
Thelocactus ( K. Schum. ) Br & R. GENUS TYPICUM  
Neolloydia Br. & R. ( incl. Gymnocactus Backeb. )  
Rapicactus F. Buxb. et Oehme  
Mammilloidia F. Buxb.

Linea B. Strombocacti F. Buxb. linea nova

Toumeia Br. & R.  
Turbinicarpus F. Buxb. et Backeb.  
Lophophora Coulter  
\* \* \* \* \*  
Strombocactus Br. & R. emend F. Buxb.  
Aztekium Boedecker  
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Leuchtenbergia Hooker  
Obregonia Fric  
Encephalocarpus Begrer  
Ariocarpus Scheidw. (incl. Roseocactus Berger)  
GENUS TYPICUM  
Neogomezia Castaneda  
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Epithelantha Web.  
Pelecypora Ehrenb.

Subtribus 3. *Ferocactineae* F.Buxb. subtrib.nov.

"Genus II" F.Buxb. nom.prov.; Echinocactanae K.Schum. pp.;  
 Mamillarieae K.Schum. pp.; Echinocactanae Br. & R. pp.; Coryphan-  
 anthanae Br. & R. pp.; Pseudomamillarieae Berger nom.nud. pp.;  
 Coryphanthae Berger nom.nud. pp.; Mamillarieae Begrer. nom.nud.pp.;  
 Chochemieae Berger nom.nud.

GENUS TYPICUM : *Ferocactus* Br. & R.

Linea A. *Ferocacti* F.Buxb. linea nova.

Genera: *Ferocactus* Br. & R. (incl. *Brittonrosea*... nom nud.)

GENUS TYPICUM

*Echinofossulocactus* Lawrence  
*Coloradoa* Boissév. et Davids.

Linea B. *Neobesseya* F.Buxb. linea nova

Genera: *Escobaria* Br. et R. emend. F.Buxb.  
*Leptocladodia* F.Buxb.

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*Mamillopsis* Weber

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*Neobesseya* Br. & R. GENUS TYPICUM

*Dolichothele* (K.Schum.) Br. & R.

*Pseudomamillaria* F.Buxb.

*Mamillaria* Haw. (incl. *Chilita* <sup>Q-cut</sup>, *Phellosperma* Br. &  
*Krainzia* Backeb., *Bartschiella* Bb. & R.  
*Porfiria* Boedeker, *Solisia* Br. & R. \*)

*Chochemieae* (K.Brandege) Walton

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 -\*) As the seed of the genus typicum of *Mamillaria* Haw., *M. simplex*,  
 has been recognized to belong to the pitted type, thus the type spe-  
 cies to the *neobesseya*, the genus *Mamillaria* now is transferred  
 to the *neobesseya* and now can be united with several of the former  
 genera belonging here (according with Reid Moran), although some  
 species of the genus *Mamillaria* in the present extent, which are  
 characterized having a perisperm do not belong here but to the  
*Coryphanthineae*. The researches on this not yet finished, for the  
 present these may remain in the genus/ *Mamillaria*.  
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Subtribus 4. *Coryphanthineae* F.Buxb. subtrib.nov.

Mamillarieae K.Schum. pp.; Coryphanthanae Br. et R. pp.;  
 Coryphanthae Berger nom.nud. pp.

GENUS TYPICUM: *Coryphantha* Lemaire

Genera : *Coryphantha* lemaire (incl. *Lepidocoryphantha* Backeb.)

THE PHYLOGENETIC DIVISION OF THE CERCIOIDEAE

by Dr. Franz Buxbaum  
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Introduction

While the subfamily Pereskioideae as well as the subfamily Opuntioideae are rather clear parts of the Cactaceae, the Cercioideae is such a manyfold branch that its division has puzzled all authors. The main reason for this difficulty has been the fully insufficient descriptions of practically all genera belonging to this subfamily. Neither the inner structure of the flowers nor the seed -- both of extreme importance for recognizing relationships in the Cactaceae -- had been examined. Thus all former attempts to get a system for this subfamily have resulted in more or less schematic divisions, which have interrupted the lines of evolution and, on the other hand, have mixed members of very heterogenous origin into polyphyletic units.

Therefore my first approach to this extremely difficult problem was a survey of the morphology of the Cactaceae ( ). These examinations covered the more advanced branches of the Cercioideae, while the more primitive genera, which have not been available to me, still remained questionable to a high degree. Nevertheless it was possible to recognize the extent of <sup>the</sup> several tribes published by former authors as well as to state the <sup>bi</sup> ~~poly~~phyletic origin of <sup>o</sup> these cacti which A. Berger ( ) united into his Trichocerei.

I discussed this provisional new division at the International Congress of International Organization for Study of Succulent Plants (I.O.S.) at Zurich in 1951. Since then it has been possible to prove at least the extent of the tribes, and, in some instances, to indicate probable evolutionary lines. Nevertheless, many examinations still will be necessary to get a final knowledge of the evolution of the Cercioideae. This is because, for the most part, recently described "new genera" are so carelessly and insufficiently described and so weakly differentiated that in most cases it is impossible to accept them. Since the Congress at Zurich I have been asked for "my system" so often, that I felt it necessary to publish at

at least the amended or new tribes and subtribes in accordance with the International Code of Botanical Nomenclature.

It should be emphasized that the inner structure of the tribes in most cases is not yet elaborated definitively and that several genera still are doubtful in their position. In addition, This publication does not intend to give any judgement with regard to the validity or invalidity of many of the genera published hitherto. This can be done only in special more or less monographic studies.

Author citation for taxa above the level of genus refer to the following publications: K. Schumann, Gesamtbeschreibung der Kakteen including Nachtrag, 1898-1903; ~~Book~~ N. L. Britton and J. N. Rose, The Cactaceae, 1920-24; A. Berger, Entwicklungslinien der Kakteen, 1926; Backeberg, C., Cactaceae Lindl. Systematische Übersicht (Neubearbeitung), in Cactaceae, Jahrbucher der Deutsch Kakteen-Gesellschaft, 1942.

It should be stated that Backeberg has overloaded his "Systematische Übersicht" with latin named taxa. Thus, in his second edition, 1942, ~~178 genera~~ ~~189 genera~~ 189 genera belong to 178 taxa above the rank of genus, and for the 162 genera of the Cerecideae there are 155 higher taxa. None of these is described with a latin diagnosis, thus all are nomina nuda, although in the second edition he has sometimes given a suitable description in german. Backeberg points out that these latin names are used only instead of numbers of a key, giving a characteristic by a name; thus they are not true taxa and, indeed, many of them have an adjective character and occur several times in different parts of the "system." Nevertheless, in the first edition, Backeberg puts his name as author behind each of these taxa.

These names are ignored here except those of tribes, subtribes and "nationes." As they are nomina nuda they could all have been ignored. However, so far as the name of any "natio" corresponds to a taxon used here and is in accord with the Code, it is used and validated here.

Even Berger did not give any description to his "Sippen" as he knew the provisional character of them. These, also, are in part used and validated here.

Tribus I. Archicereidinae F. Buxbaum, trib. nov.

Echinocactaceae K. Schum. p.p.† Cereanae Britt. & Rose, p.p.; Leptocerei Berg., nom. nud., 6.6.; Pfeifferae Berg., nom. nud., p.p.; Trichocerei Berg., nom. nud., p.p.; Austrocerei-nae-Corryocerei Backeb., nom. nud.; Austrocereinae-Trichocerei Backeb., nom. nud., p.p.; Boreocereae-Leocerei Backeb., nom. nud.; p.p.; Boreocereae-Cephalocerei Backeb., nom. nud., p.p.

Cereoideae, basi vel supra modo primitivo ramosae nonnumquam prostratae vel ascendentes; plerumque costis haud numerosis, interdum 4 ad 8 iisque altis, vel costis levibus numerosis; flores receptaculo et pericarpello primitivissimis perspicue cauliformibus, breves, squamis numerosis areolas spinosas, setosas vel minimum pilosas aut lanuginosas in axillis gerentibus. Perianthium radiatum parvum. Genus typicum: Leptocereus (Berger) Britton & Rose.

Cereoid cacti branching from the base or from the stem sometimes in a very primitive manner, sometimes prostrate or ascending. Ribs mostly few, sometimes as few as 4 to 8, but in these cases very high; or numerous but low. Flowers very primitive, the receptacle and pericarpel always having a distinctive shoot character, short with more or less numerous scales and spiny, bristly or at least hairy or wooly axils of the scales. Perianth radiate, relatively small. Type genus: Leptocereus (Berger) Britton & Rose.

This tribe contains several Central- and South American genera of very primitive character, especially with very primitive flowers. The genus Leptocereus is probably the oldest of them. As these genera have not yet been examined sufficiently, it is not yet possible to get a phylogentic arrangement of them. Some of the genera may possibly be transferred into one of the advanced tribes when examined sufficiently. This tribe contains doubtless the oldest genera of the Cereoideae. Genera included for the present are: Armatocereus Backeb., Corryocactus Britt. & Rose, Erdisia Britt. Eulychnia Phil. (incl. Philippicereus Backeb.), Facheiroa Britt. & Rose (incl. Philippicereus Backeb. and ? Vatricania Backeb.), Leocereus (Berg.) Britt. & Rose,

Leptocereus (Berg.) Britt. & Rose, Neorainondia Britt. & Rose (incl. Neocardenasia Backeb.), Macabottia Britt. & Rose, Samsipaticereus Cárđ., Zehntnerella Britt. & Rose.

Tribus II. Hylocereidinae Britt. & Rose eend. F. Buxbaum

Rhipsalidae DC.; Echinocactaeae K. Schum., p. p.; Cereanae Britt. & Rose, p. p.; Echinocactaeae K. Schum., p. p.; Rhipsalidae K. Schum.; Hylocereanae Britt. & Rose; Cereanae Britt. & Rose, 6.6.; Epiphyllanae Britt. & Rose.; Rhipsalidanae Britt. & Rose; Epiphyllae Berg., nom. nud.; Hylocereae Berg., nom. nud.; Leptocerei Berg., nom. nud., p. p.; Nyctocerei Berg., nom. nud., p. p.; Pachycerei Berg., nom. nud., p. p.; Pfeifferae Berg., nom. nud., p. p.; Austrocereae-Corryocerei Backeb., nom. nud., p. p.; Austrocereae-Leptocerei Backeb., nom. nud., p. p.; Boreocereinae-Nyctocerei Backeb., nom. nud., p. p.; Boreocereinae-Leptocerei Backeb., nom. nud., p. p.; Boreocereinae-Heliocerei Backeb., nom. nud.; Hylocereinae-Nyctohylocerei Backeb., nom. nud.; Hylocereinae-Heliogylocerei Backeb., nom. nud.; Hylocereinae-Strophocerei Backeb., nom. nud.; Phyllocactinae Backeb., nom. nud.; Epiphylloides Backeb., nom. nud.

Frutices terrestres vel in generibus deductis epiphytici a basi et supra multum ramosi, arcuati, ascendentes, penduli vel scandentes; ramis paulum stabilibus teretibus costis numerosis humilibus, saepius ramis costas paucas altas gerentibus vel trialatis vel bialatis phyllocladias formantibus; vel teretibus non costatis; ramis et alatis et non costatis saepe articulatis. Areolis in generibus primitivis spinosis, in generibus deductissimis paulum modo lanuginosis; podariis plerumque rudimenta laminae gerentibus, ibidem saepe glandulis nectariferis extranuptialibus instructis; cortice maxime mucilaginese. Flores provenientes ex apicem ramorum aggregatis; magnitudine descendentes a maximis ad minimas, nocturni albi vel lutescentes vel rosei, alii diurni colorati, rarius diurni viridescentes vel lutescentes; infundibuliformes vel rotati vel tubulati plerumque radiosi, saepe receptaculo curvato pseudozygomorphy, in genere Zygocactus zygomorphy; pericarpello generum primitivorum squamoso et spinoso, in generibus paulum deductis post anthesin

spinas formantes, in generibus plus deductis squamoso areolis absentibus, in generibus maxime deductis nudo saepe tereti. Receptaculo in generibus primitivis spinoso, in generibus deductis squamoso tantum, in generibus ~~primitivis spinosis~~ maxime deductis ~~maxime deductis~~ plus minusve nudo. Squamis receptaculi et pericarpelli prope apicem saepe glandulis nectariferis instructis. Receptaculo breviter et crasse infundibuliformi vel internodiis valde elongatis anguste infundibuliformis vel (in subtribe Rhipsalidinae) paene absentibus. Perianthio in generibus paucis maxime deductis tubum perianthii formante; staminibus fauce et tubo receptaculi variabili modo instructis numerosis vel paucis in generibus receptaculi reducti. Pistillo massivo ramisstigmaticis permultis saepe divisis, in generibus maxime deductis tenero stigmatibus paucis nonnumquam capitata cohaerentibus. Funiculi ramosi (rarius simplicibus) saepe papilloso interdum papillis strictissimis deciduis; fructus in generibus primitivis spinosus, in generibus plus deductis gibbosus, in generibus maxime deductis uviformis. Semina maxima (Nyctocereus) usque minima, testa levi vel foveolis interstitialibus punctata, perispermio absentibus, hypocotyle embryonis teneri cotyledonibus magnis. Genus typicum: Selenicereus (Berger) Britton et Rose.

Terrestrial or in the high advanced steps of evolution epiphytic shrubs of low firmness, arching upright or leaning, hanging over or climbing, much branched from base and stems. Branches terete with many low ribs or, more frequently, with only few high ribs or 3-ulate to phylloclade-like or terete without any formation of ribs. Phylloclades and terete branches often articulate. Branches mostly developing aerial roots. Areoles in lower steps of evolution spiny, in the highest steps only with little felt or a few hairs. Podaries mostly still with rudiments of lamina, often with extra-nuptial nectary at the base of the ~~indurata~~ lamina-rudiment. Cortical tissue very rich ~~and~~ with large mucilaginous cells. Flowers arising from lateral, often multiflorous and repeatedly flowering areoles, or from an aggregation of areoles at the top of the joints, very large (especially in the subtribe Hylocereinae) to very small (subtribe Rhipsalidinae linea Eurhipsalidae), nightblooming and white, pinkish or yellowish, or dayblooming of bright color, sometimes also inconspicuous

white, greenish or yellowish daybloomers; funnellform to widely rotate or tubular, radiate, sometimes by bending of the receptacle pseudozygomorphic, in Zygocactus zygomorphic. Pericarpel in the more primitive genera scaly and spiny, in somewhat higher ~~grades~~ evolved genera developing the spines in maturity, in the higher advanced genera without areoles and finally in the highest ones, nude and terete. Receptacle only in some primitive genera or species with spiny areoles in the axils of scales, in the higher advanced only with sometimes very large scales or in the highest even more or less nude. Scales very often with extra-floral nectar-glands below the apex. In ~~xxx~~ shape ~~xx~~ the receptacle can be short and massive funnellform or, by extension of the internodes, very long (especially in Epiphyllum); in the subtribe Rhipsalidinae it is reduced to nearly total absence; some highest evolved genera have a true perianth-tube. Stamens in the throat and along the walls of the receptacle, sometimes only in the uppermost part (Epiphyllum) distributed in a different manner, sometimes a separate group of primary stamens is arranged around the pistil. Mostly the stamens are very numerous; in the species with most reduced receptacle the number of stamens is reduced to few, in the most extreme case (Rhipsalis cassytha) 6 stamens. Pistil often very robuste with many, sometimes divided stigma lobes, in the most advanced genera with only few stigma lobes, which sometimes are headlike connected. Ovules at branched funicules or at simple funicules arranged in bunches; the funicules often bearing stiff papillae at the inner side of the bend; in highest advanced genera funicules short, simple. Fruits fleshy, in the primitive genera with sometimes very numerous but fine spines, in the higher evolved genera humped by the podaries of the scales, in the most advanced genera smooth and berrylike. Seeds very large (Nyctocereus) to very small (Rhipsalidinae) smooth or spotted, without any perisperm. ~~Embryo~~ Embryo with large cotyledons and a slender hypocotyl. Type genus: Selenicereus (Berger) Britton and Rose.

This tribe is subdivided into the following subtribes: Nyctocereinae Berg. ~~emend.~~ F. Buxbaum, Hylocereinae Britt. & Rose ~~emend.~~ F. Buxb., Epiphyllinae Britt. & Rose ~~emend.~~ F. Buxb., <sup>and</sup> Disocactinae F. Buxb., Rhipsalinae DC .

Subtribus 1. Nyctocereinae Berger emend. F. Buxbaum. Echinocactaceae K. Schum.,  
 6.p.: Cereanae Britt. & Rose, p.p.; Nyctocerei Berg., nom. nud., p.p.; Leptocerei  
 Berg., nom. nud., p.p.; Pachycerei Berg., nom. nud., p.p.; Austrocereae-Coryvocerei  
 Backeb., nom. nud., p.p.; Boreocereinae-Nyctocerei Backeb., nom. nud., p.p.;  
Boreocereinae-Leptocerei Backeb., nom. nud., p.p.

Frutices terrestres ramis minus stabilibus vel arbores (Dendrocereus) ramis  
 partim erectis partim pendulis; rami alati costis 3-5 altissimis vel teretes  
 costis numerosis humilibus. Flores in pericarpello plerumque etiam in receptaculo  
 areolas spinosas gerentes (excepta Linea Harrisiae, cuius areolae florales solum  
 pilosae); radiati in solo genere Aporocactus paulum pseudozygomorphi; receptaculo  
 tubiformi vel infundibuliformi; saepissime nocturni albi, in Linea Heliocerei  
 diurni rubri. Genus typicum: Nyctocereus (Berger) Britton & Rose.

Terrestrial cacti, branching from base and above, with low firmness of the  
 branches, if treelike (Dendrocereus) the branches partly pendent. Branches  
 with 3 to 5 high alate ribs or terete with numerous low ribs. Flower with spiny  
 areoles at least at the pericarpel, ~~ribbed flowers with spines~~ mostly also at the  
 receptacle (exception: Harrisia and Eriocereus, which have only hairs at the  
 areoles), radiate, only in Aporocactus somewhat zygomorphic. Receptacle tubular  
 or funnelform. Mostly nightbloomers with white flowers, Linea Heliocerei dayblooming  
 with bright red flowers. Type genus: Nyctocereus (Berger) Britton & Rose.

Linea A. Nyctocerei F. Buxbaum, linea nova. Flores primitivissimi  
receptaculo et pericarpello spinosis. Genus typicum: Nyctocereus (Berger) Britton

Flowers white, very primitive with ~~maximo~~ a very spiny pericarpel  
 and receptacle. Genera included here are Nyctocereus (Berg.) Britt. & Rose,  
Brachycereus Britt. & Rose and Peniocereus (Berg.) Britt. & Rose.

Linea B. Acanthocerei F. Buxbaum, linea nova. Flores magni, infundibuli-  
formes, albi, pericarpello spinoso, receptaculo non spinoso. Genus typicum:  
Acanthocereus (Berger) Britton & Rose.

Flowers large, funnelformed, white; pericarpel spiny, receptacle without  
 spines. Genera included here are Acanthocereus (Berg.) Britt. & Rose, and  
Dendrocereus Britt. & Rose.

Linea C. Harrisiae F. Buxbaum, linea nova. Flores magni, infundibuli-  
formes, albi, areolis pericarpelli et receptaculi pilosis non spinosis. Genus  
~~typicum~~ typicum: Harrisia Britton.

Flowers large, funnelformed, white, areoles ~~on~~ on pericarpel and  
receptacle only with hairs. Genera included here are Harrisia Britton,  
and Eriocereus (Berger) Riccobono.

Linea D. Heliocerei F. Buxbaum, linea nova. Flores diurni, rubri  
(paucis exceptionibus albis), magni, radiati vel positione staminum et  
receptaculo curvato pseudozygomorphi, pericarpello et receptaculo spinulosi.  
Genus typicum: Heliocereus (Berger) Britton & Rose.

Dayblooming with red flowers (in one taxon, white). Flowers large  
radiate to pseudozygomorphic by position of the stamens and/or bending of the  
receptacle. Pericarpel and receptacle with fine spines. Genera included here  
are Heliocereus (Berger) Britt. & Rose, and Aporocactus Lemaire.

#### Hylocereidinae

Subtribus 2. ~~Hylocereinae~~ Britt. & Rose emend. F. Buxbaum. Echinocactaceae  
K. Schum., p.p.: Hylocereanae Britt. & Rose; Epiphyllanae Britt. & Rose, p.p.;  
Hylocereae Berger, nom. nud.; Epiphyllae Berg., nom. nud., p.p.; Hylocereinae-  
Nyctohylocerei Backeb., nom. nud.; Hylocereinae-Strophocerei Backeb. nom. nud.;  
Phyllocactinae Backeb., nom. nud., p.p.

The diagnosis of Britton and Rose reads "Elongated, vine-like, climbing,  
trailing or pendent, branched cacti, the stems and branches angled, ribbed,  
fluted, or rarely flat, the joints emitting aerial roots, the areoles usually  
spiny; flowers mostly large and white, rarely red or pink; perianth-limb regular,  
or in Aporocactus more or less oblique; fruit a fleshy berry, often larg."<sup>2</sup>  
Lectotype: ~~Hylocereus~~ Selenicereus (Berger) Britton and Rose

The genus Aporocactus now is displaced into subtribe Nyctocereidinae linea  
Heliocerei.

Genera included here are Selenicereus (Berger) Britt. & Rose, Cryptocereus Alex., Deamia Britt. & Rose, Strophocactus Britt. & Rose, Mediocactus Britt. & Rose, Wilmatten Britt. & Rose, Hylocereus Britt. & Rose, Werckleocereus Britt. & Rose, Weberocereus Britt. & Rose, Eccremocactus Britt. & Rose.

No formal division into lines is proposed here, although in the outline of this treatment at the end of this article the genera are divided into three groups of presumably more or less closely related genera. When these taxa are better known a formal subdivision ~~may~~ of this subtribe may be possible. However, as Kinnach and Hutchison have pointed out, ( ), several of these genera may have to be reduced.

Epiphyllanæ Britt. & Rose, p.p.; Epiphyllæ Berg., nom. nud., p.p.; Phyllocactinæ Backeb., nom. nud., p.p.

Subtribus 3, Epiphyllinæ Britt. & Rose emend. F. Buxbaum. / Frutices epiphytici nonnumquam epiphytici scandentes, ramis phylloidioidibus variabilibus saepe ex ramis non succulentis orientibus. Flores magni, radiati, nocturni, receptaculo maxime elongato paulum squamoso; pericarpello squamoso, areolis squamarum interdum pilosis. Genus typicum: Epiphyllum Haworth

~~Epiphytici nonnumquam epiphytici scandentes, ramis phylloidioidibus variabilibus saepe ex ramis non succulentis orientibus. Flores magni, radiati, nocturni, receptaculo maxime elongato paulum squamoso; pericarpello squamoso, areolis squamarum interdum pilosis. Genus typicum: Epiphyllum Haworth~~

Epiphytic or sometimes terrestrial and climbing shrubs with phylloides of very different shape, sometimes branching from none-succulent shoots. Flowers conspicuous, radiate, night-blooming with a much elongated receptacle which bears a few scales only. Pericarpel with scales, sometimes with hairs in the axils of the scales. Type genus, Epiphyllum Haworth.

Only Epiphyllum Haw. (including Marnieria Backeb.) is included in this concept. Other genera included by Britton and Rose in their concept are here transferred to the Hylocereinae, ~~not~~ Disocactinae or Rhipsalinae

Subtribus 4, Disocactinae F. Buxbaum, subtribus nova. Frutices epiphytici phylloidiis saepe ex ramis non succulentis orientibus; floribus magnis vel maxime simplicatis, diurnis conspicue coloratis, radiatis vel receptaculo curvato pseudozygomorphicis; receptaculo tubulato vel infundibuliformi, plerumque squamoso, interdum petaloideo et in tubum perianthii transeunte; pericarpello squamoso vel paene nudo. Genus typicum: Nopalxochia Britton et Rose.

Epiphytic shrubs with phylloides which originate from none-succulent shoots. Flowers large to much simplified, dayblooming, bright colored, regular or by bending of the receptacle pseudozygomorphic. Receptacle tubular to funnelform, mostly with scales, <sup>these</sup> sometimes petaloid and transitional to tepals. Pericarpel with scales to nearly naked. Type genus, Nopalxochia Britton and Rose.

I include here Nopalxochia Britt. & Rose, Lobesia Alex., Bonifacia Standl. & Steyerl., Chiapasia Britt. & Rose, Disocactus Lindley and Wittia K. Schum. Lobesia and Bonifacia probably will eventually be united with one of these genera, probably Nopalxochia. Kinnoch and Hutchison ( ) ~~xxx~~ have indicated that they reduce Lobesia to Nopalxochia.

emond, F. Buxbaum  
 Subtribus 5. Rhipsalineae DC./ Rhipsalidae DC.; Rhipsalidanae Britt. & Rose; Pfeifferae Berg., non nud., n.D.; Epiphyllodes Beckeb., non nud., n.D.  
 Frutices epiphytici, rarissime terrestres, saepe radicantes; ramis angulatis, phylloidioidis vel teretibus, in specie unico opuntioideis, saepe articulatis; areolis lateralibus vel partim prope apicem articularum aggregatis itaque pseudoareolam pseudoternalem formantis. Flores ex areolis lateralibus vel ex aggregatione areolarum orientes; diruni, albidi, lutescentes, vel colorati, minimi mediceri vel conspicui, rotati vel subinfundibuliformes, radiati, in genere Zygodactylus zygomorphi; receptaculo plerumque brevissimo vel absenti, pericarpello squamoso vel nudo, tereti vel anguloso, rarissime areolis setaceo-aculeatis vel pilosis instructo. Folia perianthii non-humquam connata tubum perianthii formantes. Fuctus baccati, globosi, subglobosi vel angulati, a principio emergi aut interdum subimmersi. Semina parva, elongata, hilo magno basali. Embryo cotyledonibus magnis. Perispermium absens. Genus typicum: Rhipsalis Gaertner.

Forschung wichtigsten Veröffentlichungen von 1951 - 1954.

Univ. Doz. Dr. Franz Buxbaum

( Übersetzungsrecht frei !

Grundlagen und Methoden einer Erneuerung der Systematik der Höheren Pflanzen. Verlag Springer, Wien.

Der 1. Teil ( Einleitung ) analysiert die Ursachen des seit mehr als 20 Jahren währenden Verfalles der Systematik und zeigt den Weg der "dynamischen Methode" auf, die allein aus dem Verfall zu einer echten Systematik führen kann.

Der 2. Teil erörtert die Grundlagen einer Systematik der Höheren Kategorien. 1. Kapitel: Der Typusbegriff in der modernen Morphologie.

2. Kap.: Die Progressionen. 3. Kap.: Die Mannigfaltigkeitszentren.

4. Kap.: Die Selektion. 5. Kap.: Variabilität. 6. Kap.: Behandlung der Familie. 7. Kap.: Behandlung der Gattung. 8. Kap.: Das Artproblem.

Der 3. Teil behandelt eingehend die Methodik. 1. Vorarbeiten. 2. Morphologische Analyse und Morph. Monographie, 3. Entwicklungstendenzen, Tendenzmerkmale und ihre Auswertung, 4. Auswertung der geographischen, klimatologischen und geologischen Tatsachen. 5. Die Synthese.

Näher auf den Inhalt dieses 225 Seiten starken Buches einzugehen ist in Rahmen eines Kurzreferates unmöglich. Die Übersicht über den Inhalt zeigt aber bereits, daß niemand, der sich mit systematischen Fragen befaßt, daran vorbeigehen kann, was schon damit erwiesen ist, daß in 2 Jahren ein Drittel der Auflage verkauft wurde.

Morphology of Cacti .Abbey Garden Press, Pasadena Calif.

Nachdem 1951 der 1. Teil ( Wurzel und Sproß ) des schon 1948 fertigen Manuskripts erschienen war, erschien 1954 der die Blütenmorphologie enthaltende 2. Teil und das Erscheinen des 3. Teiles ( Frucht und Samen ) wurde vom Verlag bald in Aussicht gestellt.

Die in "Grundlagen und Methoden ..." geforderte "Morphologische Monographie einer bearbeiteten Familie hat hieß - zum ersten Male - ihre Verwirklichung gefunden. Erst diese Grundlage erlaubt es, systematische Fragen in der Familie der Kakteen überhaupt in Angriff zu nehmen, wobei schon die über 900 Abbildungen viele bisher nur ungenaue oder ganz falsche Angaben der Kakteenliteratur klären. Dies geht schon daraus hervor, daß nur wenige Angaben von anderen Autoren stammen, aber fast 20 Jahre eigener Forschung darin ihren Niederschlag fand. Leider sind bei der Redaktion durch Dr. E.E. Kurtz einige Fehler unterlaufen, die erst zum Schlusse in einem Korrekturblatt bereinigt werden sollen.

Eine Ergänzung dieses Buches, zugleich das Fundament einer künftigen Monographie der Kakteen-Gattungen soll die begonnene Reihe :  
Spezial Morphology of Cactus genera

bieten, von der bisher I. Leuchtenbergia (Cact. & Succ Journ. An. XXV,

Buxbaum, Autorreferat 2.

1953, p. 82-84, II. Bartschella, l.c. XXVI, 1954, p. 85-87, und III. Mam-

nilloipis ( in Druckvorbereitung). Diese Arbeiten sollen die gesamte Morphologie der Gattung in allen Einzelheiten umfassen. Von I. Leuchtenbergis wäre als wichtige Erkenntnis zu beachten, daß auch hier ein Areole haarkranz zwischen innerstem Blütenhüllblättern und äußerstem Staubblättern festgestellt werden konnte, wie er bisher erst bei Brasiliopuntia, Tacinga, und ( durch mich) bei Ferocactus und bei Pereskia sacharosa bekannt wurde. Bei Bartschella ist die enge Beziehung zu Chilita, aber

auch zu Profiria erkennbar. Wichtig ist der - noch nicht erschienene III. Teil, Mammilloidia, da er die, von manchen Autoren bestrittene Zugehörigkeit der beiden bisher hiergehörigen Arten, Mlld. candida und Mlld. ortiz-rubrona zum Ramus I der Sclerocactaceae, und somit die Richtigkeit und Notwendigkeit der Abtrennung von Mammillaria beweist. Die Testa gehört auch in jenen Fällen, die nicht die in der Erstpublikation abgebildete übermäßige Warzenbildung zeigen, doch inner dem Typus mit verdickter und + vorgewölbter Außenwand und zwischen den Vorwölbungen liegenden "Zwischengrübchen" ( engl. "spotted", lat. "foveola interstitialia") an, der weder in II., noch in III. Ast der Tribus vorkommen kann.

Eine besonders wichtige Ergänzung bildet die endgültige Klärung des "Spaltecephalium von Espostoa sericata" Österr. Botanz. Zeitschr. 99, 1952

ÜSÄ p. 89 - 99 und Referat in "Cactus" ~~Verh. Bot. Ges. Bonn~~ (Rev. Ass. France Apst. Cact) 1952, p. 3-5. Es wird nachgewiesen, daß von einem "Aufplatzen", wie es Backeberg beschrieb, keine Rede ist ( was für jeden, der Mor-

phologie kann, von vornherein klar war ). Das Cephalium ist ein echtes Cephalium im Sinne Werdermanns, d.h. es wird bereits am Vegetationskegel angelegt, wobei aber hier die Rippen so flach bleiben ( Reduktion der Podarien), daß die Walle auch der Tiefe zu kommen scheint. Tatsächlich setzen die Cephalienrippen die vor der Blühhfähigkeit normalen Rippen unmittelbar fort. Es besteht daher kein principieller, sondern nur ein gradueller Unterschied zwischen einem gewöhnlichen ( echten) und dem sogen. Spaltecephalium. ~~Sahar~~ Dies wird auch nach Photographien des Cephaliums für Cephaloverus fluminensis nachgewiesen. Daher sind die Gattungen Pseudoespostoa Backeb. und Coleocephalocereus Backeb. gegenstandslos und in die Synonymik zu verweisen. Die starke Wollbildung der Cephalien erwies sich aus 2 Faktoren bedingt: 1. starker Haarbildung aus der tragenden Areole selbst ( steifere Haare) und 2. starke Haarbildung aus den zahlreichen, wenn auch sonst rudimentären Areolen der Stielzone der Blüten, die auch dann entwickelt wird, denn die Blütenknospe selbst nicht oder nicht gleich zur Ausbildung kommt.

Qu' est ce que le Cereus euphorbioides? "Cactus" Rev. Ass. Franc. Cact. 35, 1953, p. 137-140 und "Supplement et resultat des Etudes sur Cereus

euphorbioides. "Cactus", 40, 1954, p. 51 ff. Die beiden Arbeiten klären endgültig die Stellung dieser Art auf. Die Morphologische Gesamtanalyse ( in 1953) bewies bereits, daß C. euphorbioides auf keinen Fall nahem mit Carnegiea vereinigt werden kann, wie es Backeberg tat, der dafür das Subgen. Rocksbya schuf.

Buxbaum, Autorreferat 3.

Wohl aber bestehen enge Beziehungen zu *Neobuxbaumia polylopha*. Dennoch mußte zunächst auf eine definitive Klärung verzichtet werden, da Backeberg's "Diagnose" und nachträgliche Beschreibungen von *Neobuxbaumia* derart mangelhaft und, wie bereits die Untersuchung der leicht verfügbaren *Neobuxbaumia polylopha* beiwies, sogar zum Teil falsch sind, daß sie praktisch unbrauchbar waren. Erst die wirkliche Untersuchung aller Arten von *Neobuxbaumia* durch H.E. Yale Dawson (Cact. Succ. Journ. Am.) XXIV, 1952, p. 167-173) zeigte, daß *ger. euphorbioides* tatsächlich zu *Neobuxbaumia* gehört und sich eng an *Neob. mescalaemis* anschließt (Cactus 1954). Backeberg's beide Untergattungen von *Carnegiea*, *Rooksbya* und *Euarnegea* sind daher als inhaltlos aufzulassen.

"On Neobinghamia Backeb." Nat. Cact. & Succ. Journ. London VII. 1953 p. 11.

In dieser Arbeit wird nachgewiesen, daß sämtliche Angaben in Backeberg's "Diagnose" der Gattung (bis auf nebensächliche Allgemeinmerkmale) falsch sind und weder mit Blossfeld's photographischen Aufnahmen noch mit Blossfeld's und Werdermann's Beschreibungen der (einzigen!) Art *N. alimexantha* in Werdermann's Veröffentlichung der Art übereinstimmen Unverständlich, wie man so eine Gattung's Schöpfung publizieren kann!

Where does the Genus *Astrophytum* belong? Nat. Cact. & Succ. Journ. London, VI, 1951, p. 5 ff. (deutsche Übersetzung "Wohin gehört die Gattung *Astrophytum*? Kakteen u.a. Sukk. 2., 1951, Nr. 4, p. 49-53.) *Astrophytum* stimmt in keiner Hinsicht mit den nordamerikanischen Echinocacteen (Trib. Echinocactineae Buxb.) überein. Es wurde der Nachweis erbracht, daß es in jeder Hinsicht dem gleichen morphologischen Typus angehört, wie die südamerikanische Tribus *Pseudotriloceroidineae*, und zwar schließt es sich eng an jene Entwicklungslinie an, die - mit Zwergwuchs - auch die Gattung *Fraila* umfaßt. Diese Beziehung zeigt sich nicht allein morphologisch sondern auch in geographischer Hinsicht, indem die vorwiegend uruguayische Gattung *Fraila* durch *Fr. colombiana* eine Brücke zum Areal von *Astrophytum* bildet, die überdies durch die Entdeckung von *Fr. Chiquitana* in Bolivien durch Gardenas noch verdeutlicht wird. - *Astrophytum* ist also ein Nordausläufer der Tribus *Pseudotriloceroidineae*.

Der Umfang der Gattung *Hamatocactus*. kakt. u.a. Sukk. 2., 1951, p. 1-6.

Wie schon früher (Österr. Bot. Zeitschr. 98, 1951) ausgeführt, ist *Echinoc. hamatacanthus* nach Blüte, Frucht und Samenbau ein echter *Ferocactus*, als der ihn schon Britton & Rose erkannt hatten. Er zeigt dies auch im Typus der Wuchsform sowie in den - erst von mir nachgewiesenen - Areolenhaaren zwischen innersten Blütenhüllblättern und äußersten Staubblättern. Hingegen gehört *Echinoc. uncinatus*, *Wrightii* und *crassihanatus*, für die Backeberg die Gattung *Glandulicactus* aufstellte, zweifellos zu *Hamatocactus*. Die Gattung *hamatocactus* umfaßt also derzeit: *H. setispinus* (mit *var. cachetianus*), *H. uncinatus*, ~~*Hamatocactus*~~ und *H. crassihanatus*. Die Gattung *Glandulicactus* Backeb. ist daher als + Synonym zu *Hamatocactus* zu stellen.

Die Phylogenie der nordamerikanischen Echinocacteen. Trib. Euechinocacti-

neae F. Buxb. - Österr. Bot. Zeitschr. 98, 1951, p. 44 - 104. Diese bereits

im Mai 1950 abgeschlossene Arbeit konnte leider nur unter Verzicht auf 2/3 der ursprünglich geplanten Abbildungen gedruckt werden, was ihre Beweis kraft mitunter doch erheblich beeinträchtigt. Auf Grund der morphologischen Analyse der Progressionstendenzen ergab sich, daß diese Tribus drei von einer Primitivgruppe, der die heutigen Echinocactus und Homalocephala entsprechen, ausgehende Äste umfaßt. Ramus I zeichnet sich durch das durchlaufende Merkmal einer in der Außenwand verdickten und häufig aufgewölbten Testa, Ramus II durch eine echt grubig punktierte Testa, d.h. eine in den Radialwänden verdickte, in den Außenwänden dünne und eingesunkene Testa und Ramus III durch kleine zarte Testazellen und Beibehaltung des Perisperms charakterisiert. Alle drei Äste durchlaufen, selbst wieder in Entwicklungslinien aufgespalten ähnliche Entwicklungsstufen, die ~~1951~~ Verwandtschaft vortäuschen, wo nur gleiche Entwicklungshöhe vorliegt und daher früher zu Fehleinteilungen geführt haben. Wenn auch infolge Unzugänglichkeit mancher Materialien und der Unzuverlässigkeit der Literaturangaben manche Einzelheiten noch Korrekturen erfahren dürften, liegt damit in großen Zügen das phylogenetische System der Tribus folgendermaßen vor:

Tribus euechinocactineae F. Buxb.

Linea primitiva: 1. Echinocactus, 2. Homalocephala

Lineae Progressivae:

Ramus I

Linea Thelocacti: 3. Sclerocactus, 4. Pediocactus, 5. Utahia //

6. Angistrocactus, 7. Hamatocactus (incl. Glandulicactus), 8. Gumarnia (als Gattung) 9a. Geheia F. Buxb. (publiziert in Sukkulentenkunde III 1951, siehe dort). //

9. Echinomastus, 10. Thelocactus, 11. Neolloydia (incl. Gymnocactus)  
12. Rapicactus, 13. Mammilloidya F. Buxb.

Linea Strombocacti: 14. Toumeyia, 15. Turbinicarpus, 16. Lophophora //

17. Strombocactus (emend. F. Buxb.), 18. Aztekium //

19. Leuchtenbergia, 20. Obregonia, 21. Eucephalocarpus. 22. Ariocarpus (incl. Roseocactus), 23. Neogomezia //

24. Epithelantha, 25. Pelecyphora.

Ramus II.

Linea Ferocacti: 26. Ferocactus, 27. Echinofossulocactus, 28. Coloradoa.

Linea Neobesseya: Escobaria (emend. F. Buxb.), Leptocladia (korrigiert in Leptocladia wegen Leptocladia Agardh in Österr. Bot. Zeitschr. 101, 1954 ~~2/24~~ Heft 5. ) //

31. Mammillopsis, 32. Neobesseya, 33. Dolichothele, 34. Pseudomammillaria F. Buxb. //

35. Phellosperma, 36. Ebnerella (korrigiert in Chiligt Orc. wegen Pririt), 37. Chochenia, 38. Bartschella, 39. Profiria. 40. Solisia

Ramus III. Liema unica: Coryphanthae: 41. Coryphantha emend. F. Buxb., 42. Mammillaria emend. F. Buxb. (hier wird nach neuesten Forschungen des Autors eine Änderung eintreten !)

Kurze Zusammenfassungen dieser Arbeit sind: Entwicklungsstufen und Entwicklungslinien der Tribus Euechinocactineae F. Buxb. Kakt. u. a. Sukk. 2., 1951, p. 31-38 und, ausführlicher: Stages and Lines of Evolution of the Tribe Euechinocactineae. Cact. & Succ. Journ. Am. XXIII. 1951, p. 193-197.

Ein Teilreferat : Polyphyletic Origin of the Genus *Mammillaria*. The Cact. & Succ. Journ. Great Brit. 12, 1950, p. 76-78.

Die notwendige Beschränkung des Umfanges der "Phylogenie", sowie weitere D Detailforschungen veranlaßten die Reihe "Die Gattungen der Mammillari-

stufe. I. und II. Sukkulantenkunde IV, 1951 p.3-22, III. Sukkulantenkunde

V. 1954, p.3 - 33. Die Reihe wird fortgesetzt. In dieser Reihe werden da

dort nicht ausgeführte Einzelheiten behandelt sowie die geographische Be-

weisführung ausgeführt. I. Umfaßt : I. Einleitung, Begriff *Mammillaria*-Stufe, *Goryphantha*-Stufe ) II. Die *Mammillaria*-Stufe der *Thelocacti*, *Mammillo-*

*dia* gem. nov und deren Vorstufe *Neolloydia*. Mlld. *andida* und Mlld. *ortiz-*

*rubiona* - bisher *Mammillaria* - schließen sich in allen Punkten eng an *Neo-*

*lloydia* *Begunii* an. III *Escobaria* und ihre *Mammillaria*stufe *Leptocladia*.

*Escobaria*, charakterisiert durch grubige Punktierung der Testa (Samenschale)

le) Besitz von Perisperm (Nährgewebe) im Samen und nahe nebeneinander lie-

gendes Hilum und Mikropylarloch, wird um die UnterGattung *Pseudocoryphantha*

( mit *Echiorantha*, *vivipara*, *neomexicana*, *arizonica*, *deserti*, *aggregata*, *oklahomensis*, *hesteri* ( bisher *Goryphantha*), *Brescobaria* umfaßt die bishe-

rigen *Escobaria* und auch *Hesters Escobessya*, deren Abtrennung nicht

stichhaltig ist. An *Brescobaria* schließt sich ( geographisch und morpholog-

isch ) die Gattung *Leptocladia* ( *Leptocladia* ) an ( bisher *Mammillaria* )

mit *L. leona*, *microheliopsis*, *microhelia*, *echinaria*, *elongata*, *viperina*, *niehama* und (?) *densispina* in nach Süden fortschreitender Entwicklung.

IV. Die *Neobesseya*-Hauptlinie. 1. Die Abstammung von *Neobesseya*. Die

Deckung der beiden Riesenareale von *Escob.* (*Pseudocor.*) *vivipara* und *Neobesseya*

*missouriensis* ist eine geographische Stütze der aus dem morphologi-

schon Typus abgeleiteten Erkenntnis, daß sich *neobesseya* direkt aus *Escob-*

*aria*, subgen. *Pseudocoryphantha* herleiten läßt. *Neobesseya* ist aber zu-

gleich die zentrale Gattung der Hauptlinie des Ramus II der *Brechincac-*

*tineae*. 2. *Pseudomammillaria*, die *Mammillaria*-Stufe zu *Dolichothele*. Wich-

tig ist hier auch die Fußnote auf S. 13 betr. die Autorschaft von *Dolicho-*

*thel*. Werdermann hat 1937 die tatsächlich maßgeblichen Merkmale der Gattung

*dolichothele* festgestellt. Diese Veriffentlichung benützte Backeberg, über-

setzte sie falsch ( z.B. "filamentis spiraliter affixis" statt richtig: /

"circum pistillum contortis" ) und führt sich - nur sich !! - als emen-

dierenden Autor an. Der tatsächliche Emendator ist aber Werdermann! Es müßte

daher richtig heißen : emend. Werdermann eventuell unter beifügen von

"ex Backeberg". Aber auch die Fehler in der - viel zu kurzen - Diagnose

müßten verschwinden : - *Dolichothele* ist die Vollendung des in *Neobesseya*

angebauten Typus! Als zwergwüchsige Arten mit genau gleichen Blütenbau

( Stulenburgbildung, spiralig um den Griffel gewundene Staubblätter ) gehören nun

in die Gattung noch *Dol.* ( früher *Mammillaria* ) *Baumii* F. Buxb. und *D. Sarculo-*

*sa* (Boed.) Backeb. ex F. Buxb. (Die systematische Stellung der *Mammillaria*

*baumii* Boed. - Österr. Bot. Zeitschr. 98, 1951, p. 506-508. und "*Mammillaria*

*sarculosa* Boed. ist eine weitere zwergige Art der Gattung *Dolichothele* .

*Phyton* 5, 1953, p. 22-25.) Unter Reduktion der Blüte zur *Mammillaria*-Stufe

bei gleichem morphol. Typus in Habitus und Samenbau entwickelte sich aus

ihr die Gattung *Pseudomammillaria* F. Buxb. mit *Ps. decipiens* ( Hindeglied! )

*albescens* und *camptotricha*. Vereinigung mit *Dolichothele* ( wie Tiogel sie

charakterisierung

Digitized by the Herbarium of the University of Göttingen

von Dolichothele dadurch zerstört würde.

Die Gattungen der Mamillarienstufe II, *Cehnea* & *F. Buxb. gen. nov.* ist die Mamillarienstufe der *Hamatocactus*-Linie. Samenbau und Habitus aber auch der Blütenbau von *Mamillaria* (*Dolichothele*) *Aylostera* Wedd. gehören einem grundsätzlich anderen morphologischen Typus an, als *Dolichothele*. Der Samenbau verweist sie in Ramus I der Tribus *Baechinocactineae* und zwar in die Verwandtschaft von *Hamatocactus* und *Gamarinia* Daher wird die neue Gattung *Cehnea* aufgestellt. Sorgfältige Literatur- und Pflanzenvergleiche ergaben, daß folgende bisherigen Arten innerhalb der Variationsbreite einer Art liegen und daher synonym sind: *Neomamm. Nelsonii* Br. & R. 1 1923, *Mam. balsameis* Boed. 1931, *Mam. (Doll.) aylostera* Wedd. 1931 und *Mam. balsamoides* Craig 1941. Ungeklärt infolge zu mangelhafter Beschreibung, aber wahrscheinlich hierhergehörig oder identisch ist *Cehnea beneckeii* (Ehrenb.) F. Buxb. Dieser Unsicherheit wegen ist die Gesamtart als *Cehnea Nelsonii* (Br. et R.) F. Buxb. zu führen. Die anderen als Synonyme.

Die Gattungen der Mamillarienstufe III. *Chilita* (Oreutt 1926) emend. F. Buxb (*Syn. Ebaerella* F. Buxb. 1951) Der wichtigste und schwierigste Teil der

Reihe. *I. Chilita* hat Priorität vor *Ebaerella*. Infolge Unbrauchbarkeit der Oreutt'schen Diagnose wäre *Chilita* ein nomen confusum gewesen, wenn nicht *Mam. Grahamii* (= *microcarpa*) als Typart angegeben wäre. Dies wurde infolge Unzugänglichkeit der Originaldiagnose früher übersehen. Die Diagnose mußte mit *Ch. microcarpa* als Leitart neu gefaßt werden. Folgende von Oreutt zu *Ch. gere knote* Arten gehören in andere Gattungen: *Ch. sphaelata* Ore. (Wohl sicher eine *Leptocladodia*), *Ch. vetula* Ore. (wahrscheinlich eine *Dolichothele*, wie auch v. Rottz, Zug, vermutet.) *Ch. hirsuta* (ob echt in den Sammlungen was unter diesem Namen läuft eher zu *Phellosperma*! Auf jeden Fall in andere Gattungen: *Ch. albicans* (= *Mam. albicans* als *spec. incerta*), *Ch. candida* (*Mammilloidia*), *Ch. decipiens* (*Pseudomamillaria*) *Ch. discolor* (*Mamillaria* als *spec. incerta*), *Ch. echinaria* (*Leptocladodia*), *Ch. elongata* (*Leptocladodia*), *Ch. fertilis* (*Mamillaria* als *spec. incerta*), *Ch. longiflora* (*Phellosperma*), *Ch. Nelsonii* (*Cehnea*) *Ch. palmeri* (*Mamillaria* als *spec. incerta*) *Ch. pottsii* (*Leptocladia leona*) *Ch. slevinii* (*Mamillaria* als *spec. incerta*) *Ch. xanthina* (*Mamillaria* - *Galactochylus*!), *Ch. zuberiana* (*Mamillaria Galactochylus*).

II. Morphologische und geographische Grundlagen der Gattungsaufgliederung. Morphologie und Arealgeographie müssen grundsätzlich gemeinsam herangezogen werden. daraus ergab sich folgende Gliederung der Gattung *Chilita*:

Subgen. I. *Archiebaerella*. Typ-spec. *Ch. zephyranthoides*. Zwei Linien: A A. 1. *zephyranthoides*, 2. *Meisae*, 3. *microcarpa* (Anschluß nahe *Neobesseya*) B. 4. *Ch. wilcoxii*, 5. *Wrightii* (vikariierende Arten!) Anschluß nahe bei *Escob. desertii*. - Subgen. II *Procochemia*. Typ-Spec. *Ch. sheldonii*. Westliches Subgen mit 4 Linien: *Fasciculata*-Linie: 6. *fasciculata*, 7. *maratlanensis*, 8. *occidentalis*, 9. *yaquensis*. - *Oliviae*-Linie: 10. *Oliviae*, 11. *inaiae*, 12. *swinglei*, 13. *sheldonii*, 14. *gueldenanniana* (*Syn. guivocobensis*), 15. *alamensis*, 16. *colonensis*. (Nachtrag: *M. narmierana* ist *syn. zu Oliviae*, *Mam. pseudocolonensis* *syn. zu inaeae*.) - *Dioica-capensis*-Linie: 17. *dioica*, 18. *blossfeldiana*, 19. (?) *aravillata*, 20. *hutchinsoniana*, 21. *fruticosa*, 22. *capensis*, 23. *goodridgei*, 24. *insularis*, 24 a. *boottii*. - *Angelensis*-Linie: 25. *angelensis*, 26. *phitsuiana*, 27. *verhaertiana*.

Subgen. III. *Euanacistracantha* F. Buxb. 28. *G. unihamata*, 29. *gasseriana*, 30. *sinistrohamata*, 31. *bombycina*, 32. *weingartiana*, 33. *mercedensis*, 34. *Moelleriana*, 35. *boedeckeriana*, 36. *posseltiana*, 37. *painteri*, 38. *rettigiana*, 39. *tacubayensis* (?), 40. *jaliscana*.

subgen. *Erebmerella*: 41. *icamolensis*, 42. *kuzeama*, 43. *gilensis*, 44. *aurihamata*, 45. *erectohamata*, 46. *trichacantha*, 47. *erythrosperna*, 48. *haehneliana*, 49. *longicoma*, 50. *multiformis*, 51. *bocasana*, 52. *multihamata*, 53. *zeilmanniana*, 54. *knobeliana*, 55. *Willdii*, 56. *pygmaea*, 57. *schelhasae*, 58. *criniformis*, 59. *crinita*, 60. *glochidiata*, 61. *pubispina*, 62. *scheidweileriana*, 63. (?) *ancistroides*, 64. (?) *monacistra*. - Subgen. *Rectochilita*. 65. *pilisipina*, 66. *viereckii*, 67. *multiceps* (Syn.: *caespititia*, syn. *pusilla-texana*) 68. *prolifera* (syn.: *pusilla-haitiensis*), 69. *fragilis* (syn. *gracilis*), 70. *sauluisensis*, 71. *schieliana*. - Subgen. VI. *Acentracantha*: 72. *lenta*, 73. *magallanii*, 74. *leugdobleriana*, 75. *lasiacantha*, 76. *humboldtii*, 77. *herrerae*, 78. *estanzuelensis*, 79. *aureilana*, 80. *schieleana*, 81. *plumosa*.

Am S. gen. *Acentracantha* schließt sich die Gattung *Solidia* an. *Mammillaria solidioides* Backeb. ist nichts weiter als eine Standortvarietät von *Solidia pectinata*, die in allen wesentl. hem. Punkten die Eigenschaften von *Solidia* hat.

Anhang: *Mammillaria*, subgen. *incertae sedis* *Ambroebmerella*: Diese Sidgruppe schließt sich mit *a. ten.*, die noch eine deutlich grubig punktierte *Festa* haben, eng an *Chilita Wilcoxii* und *Wrightii* bzw. an deren Stammformen *Escobaria* vom *deserti*-Typus. Ihr Entwicklungszentrum liegt jedoch in der Sierra Madre de Sur. Nur *M. carretii* und die nahe verwandte, doch anscheinend deutlich getrennte *M. saffordii* scheinen sich selbständig aus der Abstammungsgruppe entwickelt zu haben. Die grubige Punktierung und die Pigmentierung der *Festa* geht in Zuge der Höherentwicklung innerhalb dieser Gruppe verloren, so daß ihre Samen denen der *Coryphantha*-Abkömmlinge bis auf das Fehlen des *Perisperms* ähnlich werden. Nach bisheriger feststellung gehörten hier: 1. *M. solidi*, 2. *M. nunezii* (besser als eine Art zusammenzuziehen) 3. *deliusiana*, 4. *bekla*, 5. *M. witheniana*, 6. *guerreronis*, 7. *zapotensis*, 8. *spinosissima*, 9. *neocoronaria* (= *coronaria*) 10. *rekei*, 11. *recoiana* 12. *carretii*, 13. *saffordii*, 14. *hamata*, 15. *eriacantha*.

Als wichtige offene Probleme wird die Frage nach dem Samenbau der Leitart von *Mammillaria*, *M. simplex* Haw., jene von *M. albicans* und von *M. neopalmeri* bezeichnet. Aus Arealgeographischem erwägungen wäre zu vermuten, daß *M. simplex* doch auch in diese Gruppe, die von *Ramus II* abstammt, gehöre, wenn auch die Samenbeschreibungen in der Literatur das Gegenteil zu besagen scheinen. Es war trotz aller Bemühungen des Autors nicht möglich, Samen dieser Art zu erhalten. Sollte aber diese Vermutung sich als richtig erweisen, so könnte *Chilita* wieder in *Mammillaria* als Unterart aufgenommen, dann müßte allerdings die Frage der *Mammillarien* mit *Perisperm* noch erörtert werden. *M. albicans* und *neopalmeri* mit grubig punktierten schwarzen Samen aber durchaus abseitigen Arealen und Wuchs liegen im Anschluß noch ganz unklar. Auch einige schon länger bekannte Arten konnten mangels Material und infolge völlig unzureichender Beschreibungen nicht eingereicht werden. Es sind noch viel, sehr sorgfältige Untersuchungen nötig, das *Mammillarien*problem restlos zu klären.

Buxbaum, Autorreferat 8.

Cactaceae

Vorarbeiten zu einem phylogenetischen System der *Kakteen*. (Vortrag,

gehalten auf dem I. I.O.S.-Kongress, Zürich 1950) *Kakteen* u.a. Sukk.

4, 1953, Nr.1., p. 2-7. Keines der bisherigen Systeme kann Anspruch darauf erheben auch nur annähernd den phylogenetischen Tatsachen zu entsprechen. Dies ist gegenwärtig auch nicht möglich. Für den vorläufigen Gebrauch wird ein Provisorium vorgeschlagen, das so geartet ist, daß es mit zunehmender Erkenntnis zu einem phylogenetischen System ausgebaut werden kann, da die großen Züge der Abgeleiteteren Tribus schon weitgehend geklärt werden konnten. Da die älteren Gattungen schon infolge Materialmangels noch höchst unzureichend bekannt sind wird ein Tribus "provisorium" "Archicereideae" geschaffen in dem sich aber ebenfalls einzelne Linien bereits abzeichnen beginnen. 5 Stammschemata, die die derzeitigen Kenntnisse wiedergeben, ergänzen die textlich beschränkte Arbeit.

Bedeutung und Anwendung des Morphologischen Typus in der systematischen

Forschung, (Antrittsvorlesung gehalten an der Universität Wien. Jahres-

bericht des Bundesrealgymnasiums in Judenburg 1954. Diese Arbeit, die für jeden Systematiker von Bedeutung ist, enthält ein für die Kakteenkunde wichtiges Forschungsergebnis: Die Entwicklungslinie, d.h. Abstammung der Phytolaccaceae-Phytolaccinae, die (siehe Buxbaum in Sukkulantenkunde 29 III) zugleich die Abstammungsgruppe sowohl der Aizoaceae als auch der Cactaceae ist. Die Phytolaccaceae-Phytolaccinae lassen sich über die Illiciaceae direkt von den Magnoliaceae als der ältesten Angiospermenfamilie ableiten.

Alkalität - Ursache des Sämlingssterbens. *kakt.u.a.Sukk.* 4. 1953, Nr.2

p.22-25. und pH 8 - Lebensgefahr! Sukkulantenkunde V. 1954 p.40-46

(Vortrag, gehalten auf dem II. I.O.S.-Kongress in Monaco 1953.)

Beide Arbeiten beschäftigen sich mit dem Einfluß der Bodenreaktion auf das Leben der Kakteen. Es wird gezeigt, daß zumindest viele Arten extrem empfindlich gegen die, durch den übermäßigen Ca-carbonatgehalt des Gießwassers (und Mg-carbonat) hervorgerufene Alkalität des Bodens besonders im Sämlingsalter extrem empfindlich sind. Viele zurzeit nur gepfropft lebensfähige Arten dürften sich als besonders extrem acidophil erweisen. Bewiesen ist dies bei *Zygocactus*, dessen oberer Todepunkt schon am Neutralpunkt liegt, der darum auf die weniger alkaliempfindliche *Pereskia* gepfropft wird. Verkrustung der Oberfläche stehen miteinander in ursächlichem Zusammenhang, da die Blausaugen typisch kalk- und alkali-liebend sind und sich erst entwickeln, wenn der Ca-carbonatüberschuß in den oberflächennächsten Schichten infolge Oberflächenverdunstung bis zur Krustenbildung und bis pH 8-9,5 angestiegen ist. Prüfung der Bodenreaktion, zumindest auf kolorimetrischem Wege, die jedes Kind ausführen kann, werden zur unerlässlichen Pflegemaßnahme jedes Kakteenhalters werden. Leider sind die Bodenansprüche aus dem Heimatgebieten noch unerforscht.

Abgeschlossen 1.1. 1955.

=====

1. Tribe Archicereidinae Buxbaum

Corryocactus Britt. + Rose

Erdisia Britt. + Rose

Eulychnia Philippi

Facheiroa (Thrixanthocereus)

Leocerus

Leptocereus ————— TYPE

Neoraimondia Britt. + Rose

Zehnerella.

2. Tribe Hylocereidinae Berger <sup>emend. Buxbaum.</sup> ~~emend. Buxbaum.~~

Type. Selinicereus

a. subtribe Nyctocereinae (Berger) ~~emend.~~ Buxb.  
(1) Line Nyctocerei  
Type. Nyctocereus Buxb.

Brachycereus

Peniocereus

(2) Line Acanthocerei Buxb.

Type. Acanthocereus

Dendrocereus

(3) Line Harrisiæ Buxb.

Type. Harrisia

Eriocereus

(4) Line Heliocerei Buxb.

Type. Heliocereus

Aporocactus

b. subtribe Hylocereidinae Britt. + Rose

Type Selinicereus

Wencklea.

Webera.

Eccremis.

Mediocactus

Wilmattea

Hylocereus

Selinicereus

Cryptocereus

Deamia

Strophocactus

2

c. subtribe Epiphyllinae (Berg.) Buxb.

Epiphyllum - TYPE

d. subtribe Phyllocactinae Buxb.

Nopalxochia - TYPE (Lobelia)

Chiapasia

Disocactus

Wittia

e. subtribe Rhipsalidinae Buxb.

Type Rhipsalis

(1) Line Archirhipsalidae Buxb.

Pfeiffera - Type

(2) Line Zygocacti Buxb.

Schubertgera - Type

Erythrorhipsalis

Harrisia

Rhipsalidopsis

Zygocactus (Epiphyllanthus)

(3) Line Eurhipsalidae Buxb.

Rhipsalis - Type

Lepismium

Pseudorhipsalis ?

3. Tribe Pachycereidinae Berg.

Type Pachycereus

Neobuxbaumia

Cephalocereus

Pilocereus

etc. ?

Tribe 4. Gymnoceridinae Berg.

Peptantherocereus - Type

Browningia (Gymnantherocereus)

etc. <sup>niller</sup>

Cereus (<sup>Bt+R.</sup> Monillea) (subpilocereus)

Jasminocereus Bt+R.

Steltonia Bt+R.

Arrojadoa Bt+R.

~~St~~ Stephanocereus Berger.

Austrocephalocereus Bilibig. (Colocephalocereus Bilibig)

Tribe

5. Tribus Trichoceridinae <sup>Element. Buxb.</sup> ~~Berg. & Buxb. comb. nov. element.~~  
Type -

a. subtribe Trichocereidinae

- Trichocereus
- Echinopsis (Pseudobivia)
- Hoageocereus (Peruvocereus)
- Arthrocerus (Seticechinopsis)
- Espostoa (Pseudoespostoa)
- Saehrensia
- Acanthocalycium

b. subtribe Rebutidinae

- Lobivia
- Rebutia - Type.
- Chamaecereus
- Mela

c. subtribe Loxanthoceridinae Baekeb.

- Loxanthocereus (Maritimocereus)
- Borjicactus (Clistanthocereus + Boliviacereus) Type
- Denmoya
- Clistocactus
- Seticereus
- Orocereus
- Morawetzia
- Arequipa
- Maticana

Oroya ?  
Pogonocereus ?

6. Tribus ~~Tria~~ Pseudotrichocereidinae

Austrocaetus  
Notocactus → Type  
Brasiliacactus  
~~Sclaya~~

Eriosyce

Copiapoa

Neoporteria

Parodia  
Bloosfeldia  
Frailea  
Astrophytum

Gymnocalycium  
Disocactus

Malesocarpus  
~~Tria~~  
Melocactus

7. Tribus Echinocereidinae

Type - Echinocereus

Bergers cactus  
Machaerocereus  
Rathbunia

Wilcokia

Echinocereus

8 Tribe. Euechinocactidinea Burb.

a) Subtribe Echinocactineae  
Type - Echinocactus  
Homalocephala

\* Subtribe Thelocactineae  
Type - Thelocactus

Line: Thelocacti - Type Thelocactus

Line Strombocacti Type Arisarumpus

c) Subtribe Ferocactineae Type Ferocactus

Line Ferocacti  
Ferocactus  
Echinofossulocactus  
Coloradoa

Line Neobesseya  
Escobaria  
Leptocladodia  
Mammillopsis  
Neobesseya  
Dolichothela  
Pseudomammillaria  
Mamm.  
Cochemia

d) Subtribe Coryphanthineae  
Coryphantha

RECOMMENDATIONS FOR REORGANIZATION OF THE I.O.S.

by

P. C. Hutchison

The following suggestions are made for your comment. At present the discussion concerning these points will be limited to Buxbaum, Byles and Krainz. After hearing from these three, Ix will prepare a second draft to submit to the I.O.S. with our four signatures to appear at the end of it.

I. If the IOS is ever to accomplish much, it must grow in membership. The present organization of the society prevents growth, except in a most limited sense, for the following reasons: a) finances are limited and the potential for increasing them is small; b) too few qualified persons exist for the present membership criteria; c) there is no definite autonomy nor definition of functions of the national sections; d) the titles for the officers have no meaning to non-members.

II. With reference to ~~ix~~ I-d, above, it is important in communications with others outside our society that signed letters, with titles, communicate meaning to those reading them. I can see no justification for any titles other than those customary for biological societies. This ~~ix~~ point is more important from the standpoint of communication with non-biologists (amateurs, potential benefactors, etc.) when the position and authority of the writer should be evident in the title he holds in the society. Present titles convey no such meaning and involve lengthy explanations or create doubt in others.

III. With reference to I-c, the functions of the national sections, at present, seem to be, primarily, to decrease the work-load of the Secretariat. Something more than this is essential to making membership in the IOS attractive and to individual ~~encouragement~~ encouragement of individual accomplishment by national sections---each according to its desires and potentialities. The US section, for example, might, hypothetically, be able to raise funds and administer them, but certainly not without some assurance that such activities fall within their prerogative and fit into the purposes of the IOS. Objectives with money-appeal, as well as eye-appeal, should be sought by the ~~IOS~~ IOS, of sufficient scope that each National Section might find a place for itself and function toward specific material goals.

IV. With reference to I-b, the total potential membership, at present, is probably no more than 150 persons. This would include many non-scientist members, whose contributions to the study of succulent plants fall into other categories. At most probably no more than \$390.00 a year could be raised from the membership, since scientists, for the most part, cannot afford high dues, nor can they contribute funds. Funding of this sort, or dependence on donated time and funds, is, to say the least, tenuous.

V. With reference to I-a, unless membership is increased, and an attractive program of objectives laid-out, there seems little likelihood of a permanent budget for the society.

VI. I have assumed that the present organization of the society was temporary, and that it has served its purpose in that the original objectives of the IOS have been realized. Now new objectives should be sought and a new Constitution is called for. In considering this matter I believe the following points should be given special consideration:

1. No one should be excluded from membership on the basis of value-judgements as to the benefit, or otherwise, to be gained by the IOS by their membership. Membership criteria should be objective. Any other course would imply a weakness on the part of the organization.
2. Several categories of membership should be established, with voting privileges restricted to one or two of these.
3. A membership-committee should be established to pass upon the qualifications of nominees to voting membership. Their studies should be objective, intensive and free of prejudice, and they should seek consultation with others when it is felt that this is called for. Criteria for voting membership should be definitely stated, insofar as possible.
4. Emphasis should be given to the importance of the Type Method, of the letter of the International Code, of depositing living types, and of providing definitive photographs and/or drawings with the descriptions of new taxa. In these respects the IOS should seek to be a model for taxonomists working on groups of plants of interest to us.
5. Non-conformity to the International Code should constitute grounds for disqualification of any category of member by vote; probably a limitation as to retro-activity of this point should be made.
6. Specific objectives beyond concepts of cooperation should be sought. Examples, a periodical, monographs, etc.
7. Objectives should be broad enough to be attractive (fund-raising!), narrow enough to be achievable, and imaginative enough to aim at goals probably not otherwise possible. The aim should be to supplement or integrate what is already being done, as much as to attempt new things.
8. Due consideration should be given to holding members in the IOS in addition to getting them.

VI. The following tentative proposal is an example of one type of membership organization which might be considered appropriate to these objectives:

Regular member. Anyone paying dues of a fixed amount.

Patron. Anyone paying dues of \$50.00 per year

Life member. Any member whose cumulative contributions or dues amount to \$500.00 or more, or who is elected to this category by a Congress.

Honorary member. Any person elected to membership for special accomplishments in exploration, introduction, horticulture, etc. (Give examples).

Fellows. Any scientist or other person elected for his accomplishment in research on succulent plants, as indicated by published work, or for other specially meritorious contributions to science.

VOTING PRIVILEGES are restricted to Fellows and Honorary members. Present members should be given an option as to the category of membership they desire. Other categories of membership should be considered. A planned program for new members should be instituted.

Jan 1957?

A PROPOSAL FOR REORGANIZATION OF THE I. O. S.

by

P. C. Hutchison, R. S. Byles, F. Buxbaum, and H. Krains

- A. From study of the Constitution of the I.O.S., the activities of the society for the past several years, including three International Congresses, and the various communications from its Secretariat, we feel that the following conclusions about its functions and purposes can logically be made:
1. The present organization of the society is cumbersome and largely ineffectual in accomplishing goals of any considerable interest to the majority of the membership.
  2. The qualifications for membership and procedures for attaining same are vague and ill-defined in extreme; hence it may be assumed that the objectives of the society, in building its membership, are also vague.
  3. Considerable personal expense and time has been dissipated in largely unproductive organizational correspondence and in Congresses which might be more energetically redirected into more productive, more generally remunerative and/or scientifically profitable channels.
  4. The existing titles as well as the functions and powers associated with these titles are obsolete.
  5. The fellowship implicit in the nature of the I.O.S. exists in theory only, and performs no significant aggregate function whatsoever.
  6. Whatever original purposes resulted in organization of the I.O.S. must have by this time been achieved. A loose relationship between a number of interested individuals over the world exists. The I.O.S., to survive, must now seek objectives of stature to compel cooperation of interested professional and amateur botanists. Its present Constitution should be re-written with these objectives in mind and this should be done as quickly as possible.
- B. We feel, if the foregoing statements can be accepted in whole or in large part by the majority of our membership, that a committee should be set up to draft a new Constitution for this organization, and toward this end we submit the following recommendations.
1. The I.O.S. should be declared an international working scientific society and the concept of a loose fellowship should be abandoned as superfluous.
  2. Existing terms for officers and officials should be abandoned. Administrative officials should be, primarily, attached and unattached botanists. Titles should be those customary for such organizations, such as President, Vice President, Secretary Treasurer. The "National Section" organization should be re-evaluated from the standpoint of whether or not it is necessary, considering in particular the organization recommended here.
  3. Officials should be elected biannually but should be eligible for re-election. Voting on new members would occur once a year. A membership committee would be appointed to recommend or handle recommendations for new members, obtain necessary information, and forward ballots to the membership once a year, at a prescribed time.

4. Several membership categories should be established, as follows:

Fellows: Elected from the Regular Membership strictly on the basis of serious scientific work achieved. Entitled to all privileges.

Regular Members: Elected more or less on the existing basis. Entitled to all privileges. The "existing basis" should be defined.

Associate Members: Non-elected members. Entitled to all privileges except electoral voting powers, or else no voting powers at all.

5. Dues should be fixed at a sum to include any literature sponsored by the society. It is recommended that dues for all categories of membership be equal.
6. A prime objective of the organization shall be the publication of a high quality central periodical, the funding of which is inseparable from considerations of a greatly increased paying membership. This might first be considered in terms of a Yearbook or equivalent publication. Editorial policies and standards should be equivalent to those for any other scientific body, and the Editorial Board so constituted as to insure realization of this objective. The Editorial Board should determine name and objectives, but the objectives, in particular, should be to provide a medium of publication for serious and permanent contributions of value, in particular, a place for publication of long or of technical articles not entirely appropriate in ~~xxxxxx~~ amateur periodicals.
7. Due consideration should be given the possibility that an I.O.S. publication might best grow or develop from an amalgamation with an existing publication.
8. Regional Treasurers should be appointed by the President, and their sole function should be to collect funds.
9. All other communications should be from the President or other officials directly to the individual members. Initially these might be considered as a periodical "Bulletin of the I.O.S." to be treated in standard bibliographic style with volumes, numbers, pagination, etc., conforming to standard practices, and for reasons of expense, should initially be mimeographed rather than printed.

Jan 1959?

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7. ~~Congresses in the past have largely been legislative assemblies. Due consideration should be given to reducing to the minimum such activities at the Congresses, and of giving more emphasis to scientific and horticultural matters.~~

VII. Due consideration should be given the possibility that an I.O.S. publication may best grow or develop from an amalgamation with an existing publication.

8. Regional Treasurers should be appointed by the President, and their sole function should be to collect funds.  
other

9. All/communications should be from the President or other officials directly to the individual members. Initially these might be considered as a periodical "Bulletin of the I.O.S." to be treated in standard bibliographic style with volumes, numbers, ~~page~~ pagination, etc., conforming to standard practice, and for reasons of expense, should ~~probably~~ be mimeographed rather than printed.

*initially*

*This is probably my fault - bad wording. Actually we cannot say that too much Congress time has been spent on "business". At London it occupied 3 hrs. out of 5 days. What I have been trying to say is that legislative power in Congress ought to be curtailed. "III" goes a long way towards this. I am sorry if I misled here.*


*RSB*



## MENU



## VINOS



VI Congreso I. O. S.

### CENA

ofrecida por el  
Servicio Municipal de Parques  
y Jardines

Consomé en tiza. Trás Filletes

Supremas de Lubina  
con Gambas. Parisiën

Medallones de Ternera  
Montglas

Biscuit glacé con fresas  
al chantilly

Café doble

Licores

Las Campanas (Rosado)

Champán Nadal (Brut)  
Agua Mineral de Burriach

### EN EL BAR:

Aperitivo-Cocktail  
Fruvolidades La Pergola  
Croquetas de avo  
Calamares a la Romana

Barcelona, 9 de Junio de 1961

The best greetings from the final dinner  
of the 20.5 Congress to you and  
all American members!

Always, sorry

avec un million  
de saluts à vous  
con un afectuoso saludo  
de Buxbaum  
Fernando Riniere

Schachtel

BK Soom

John Sabala

Loei Lessner

J. Branning  
L. Somjai

D. H. Anderson - Fells

M. Haus Antonino Beltray

Caruth Duffan

Mercedes Panella

M. H. Hutchison Paula Cullaraine

~~John Hutchison~~

Hi admiracion por  
H. Hutchison.

*[Signature]*

*[Signature]*

*[Signature]*

La Pergola

Pro Panamob

~~Financia~~

#0 Mr Hutchison

A mi buen amigo con cariño  
Juan Panella

*[Signature]*

A.F.H. BUINING

To my dear friends I only  
write my best regards -  
*[Signature]*

To Paul C. Hutchinson

Mr Wiley

Mr Trinkl

*[Signature]*

RESTAURANTE

de

*[Signature]*

P.O. Box 4189 - 1965